

electrotechnical research at the Osram and Telefunken companies and the biography of Iris Runge, an early female pioneer in this field. In the first section, Renate Tobies asks why Runge chose the atypical career path of industrial mathematical research, describing her family background and early intellectual influences and looking to Ludwik Fleck's concept of a "thought collective" to explain the interaction of these factors. Runge's career path emerges as a product of fortuitous family circumstances and fortuitous timing. A member of the extended Du Bois-Reymond family and daughter of the mathematician Carl Runge, Iris Runge was raised in an environment supportive of women's intellectual activity at a time when higher education had recently become accessible to German women.

Teaching was the expected career path for educated women, especially those with degrees in the sciences and mathematics, but Runge's left-leaning political affiliations clashed with the politically conservative state school system. Industrial research offered an alternative, however, since Runge's career coincided with an increasing recognition that mathematics could play a significant role in industrial innovation and production. In the second section, the strongest in the volume, Tobies presents Runge's activities at Osram and Telefunken, companies that produced lightbulbs and electronic tubes for radio and other uses, and situates them within the institutional context of early twentieth-century industrial research. The relative newness of these products meant that this industry was structurally and personally open in ways in which more established industries were not, and one result was the willingness to integrate applied mathematics into various stages of the manufacturing process. Runge's particular area of expertise lay in the further development of graphical methods as a tool in applied mathematics, which eliminated time-consuming calculations and enabled technicians and mathematically less skilled workers to solve mathematical technical problems. As part of a mathematical team at Osram, she also developed graphical and statistical methods to solve a variety of problems in quality control in bulb and tube production.

The final section of this volume returns to biography and discusses Runge's political and social activities from the 1920s to the 1950s, particularly during National Socialism and World War II. While state employment restricted political activity, industrial employment allowed greater freedom for left-leaning political and social engagement. Tobies's research shows that although tube research and manufac-

ture was relevant to the war and National Socialist groups quickly gained a hold at the Osram company, technological industries still offered a degree of protection to political nonconformists with valuable expertise. In her brief conclusion to this section, Tobies observes, in addition, that electrotechnical researchers tended to be more democratically oriented than researchers in other industries and interprets a tradition of liberal tendencies in this industry as due at least in part to the role of liberal Jewish company founders and directors. In addition, an emphasis on performance and ability above religion and gender meant that a career as an industrial researcher was open to individuals, especially highly educated Jews and women, who would have had little chance at a university career and who often tended to liberal positions. Unfortunately, this point is only cursorily discussed; it certainly deserves a deeper look.

*"Morgen möchte ich wieder 100 herrliche Sachen ausrechnen": Iris Runge bei Osram und Telefunken* bears many of the hallmarks of a *Habilitation* work, with occasionally superfluous explanatory footnotes and introductory statements on chapter structure; and some of the connections drawn between Runge's early influences and her later scientific and political activities are tenuous. On the whole, however, this is a solidly researched study of a neglected aspect in the history of technology—the spread of applied mathematics in industrial research. Abundant use is made of archival material, including extended quotations from Runge's private correspondence and documents from the industrial laboratories, and additional archival material is provided in a lengthy appendix. Some subchapters contain mathematical detail, but an understanding of mathematics is not necessary to grasp the larger biographical and social historical discussion.

ELIZABETH NESWALD

**Sacha Tomic.** *Aux origines de la chimie organique: Méthodes et pratiques des pharmaciens et des chimistes (1785–1835)*. (Collection "Carnot.") 322 pp., illus., tables, app., bibl., index. Rennes: Presses Universitaires de Rennes, 2010. €20 (paper).

In eighteenth-century continental Europe, a range of hybrid figures, neither unambiguously natural philosophers nor clearly artisans or engineers, contributed to the natural sciences. The three largest groups among these hybrid figures were learned military engineers; trained officials in the state bureaucracy charged with civil en-

gineering, forestry, or mining; and apothecaries acknowledged as botanists, mineralogists, or chemists. In the German chemical community, approximately half of the chemists had pharmaceutical apprenticeship training or were practicing apothecaries, and it was similar in France, where these persons were called pharmacist-chemists. Sacha Tomic's excellent book, which is a revised version of his dissertation, scrutinizes the various interactions of the eighteenth-century French pharmacists and chemists and further characterizes the hybrid persona of the French pharmacist-chemist around 1800. The second goal of his book is to trace the activities that contributed to the emergence of the new culture of organic or carbon chemistry in the 1830s.

Tomic identifies the chemical analyses of plants and plant materials as the most significant type of chemical activities both in the scientific life of the pharmacist-chemist and in the formation of modern organic chemistry. Unlike analysis in mathematics and physics, eighteenth-century chemical analysis was a materially productive activity taking place in the laboratory, which actually took apart the substance to be analyzed by means of chemical instruments. It thus produced new material substances as well. From a conceptual point of view, chemists regarded the material products of analysis, under certain methodical preconditions, as the true natural components of the analyzed compound. But they also explored the potentially useful functions of these substances. In the case of plants, the pharmaceutical usefulness of the analytical products stood in the foreground. Plant analysis thus was a field of natural inquiry where the commercial and epistemic interests of pharmacists and chemists met—and where these different interests could be mixed. It was thus also the ideal niche for the pharmacist-chemist.

In accordance with his emphasis on practice, Tomic starts *Aux origines de la chimie organique: Méthodes et pratiques des pharmaciens et des chimistes (1785–1835)* with a magnificent chapter on eighteenth-century chemists' most important social institution and site of activity, the laboratory, including detailed descriptions of instruments, materials, and techniques. As the pharmacists were the predominant group of owners of chemical laboratories, Tomic avoids from the beginning the anachronistic separation of eighteenth-century chemistry into a theory and science, located mainly at the Paris Academy of Sciences, and a commercial practice. Chapters 2 and 3, as well as parts of the last, fourth, chapter, study different types of chemical analysis along with their productive,

useful dimension. In Chapter 4 and the conclusion, Tomic further discusses questions related to the new culture of organic chemistry in the 1830s.

Chapter 2, which is devoted to the "immediate" or "proximate" analysis of plants and plant materials, is central for Tomic's argument. The proximate analysis of plants gained prominence in the mid-eighteenth century and was, in principle, untouched by the "chemical revolution." The goal of this type of analysis was acquisition of knowledge about components of plants like oils, gums, resins, wax, and sugar, understood as compounds that were almost as stable as chemical elements and distinctive products of vegetable life. Varieties of these kinds of substances were also known in the European arts and crafts and from overseas trade. The main goal of chemical analysis was their clear identification through chemical methods. As a result of chemical analysis, commercial materials—say, cane sugars from different countries and of different shapes and colors—were sometimes identified as insignificant varieties of one and the same species of chemical substance. But in their analytical attempts to identify single species of proximate components of plants chemists did not only reduce the multiplicity of commercial materials; the inverse happened as well. For example, Tomic demonstrates that Michel E. Chevreul's analysis of indigo, an important exotic dyestuff, resulted in the material separation of several proximate components (pp. 116–119). Chevreul identified only one of these substances as the pure *principe colorant*, also named *indigotine*. However, he did not claim that the other components of commercial indigo were functionally useless in dyeing. On the contrary, Chevreul, who was also director of dyeing at the Gobelins manufactory in Paris, argued that all components making up commercial indigo contributed to its use as a dyestuff. Moreover, Chevreul did not argue that the chemists could ignore impure substances. Instead, he kept the traditional terms "*matière colorante*" and "*extrait colorante*" for denoting commercial indigo, now defined as an impure substance that was nonetheless important for chemists' practice.

The case of indigo also demonstrates certain limits of Lavoisier's "chemical revolution." Lavoisier had proposed that all vegetable materials were made up of carbon, hydrogen, and oxygen and, further, that the various species of vegetable substances differed according to their different proportions of these three elements. But the subsequent generation of chemists did not follow his method. Well into the nineteenth cen-

tury, leading chemists believed that organic substances did not obey the stoichiometric laws established in inorganic chemistry. They thus continued to identify the organic substances in a traditional fashion, using a set of chemical tests with reagents, which they supplemented by new physical measurements. It was only in the new culture of organic chemistry, established between the late 1820s and the 1840s, that chemists would define a pure organic substance as a stoichiometric compound and unambiguously identify it through its qualitative and quantitative elemental composition and its chemical formula.

URSULA KLEIN

**Takahiro Ueyama.** *Health in the Marketplace: Professionalism, Therapeutic Desires, and Medical Commodification in Late-Victorian London.* xv + 320 pp., illus., app., bibl., index. Palo Alto, Calif.: Society for the Promotion of Science and Scholarship, 2010. \$55 (cloth).

Those who would be put off because the book under review is a detailed study of a narrow area in the history of medicine would be wrong. Both explicitly, through the provocative questions raised, and unintentionally, through the issues bypassed, this book raises a host of questions important to all historians of science.

A modified version of a 1998 doctoral dissertation submitted to the history program of Stanford University, *Health in the Marketplace* bears marks of its origins. The methodologically oriented introduction and conclusion are separated by five chapters dealing with the British Medical Association's campaign against patent medicines, commodity culture, electrotherapies and the medical quack, electrotherapeutic institutes and the Royal College of Physicians, and massage therapy. The book is serious and generally competent, though with the passage of time the occasional footnote has become garbled and references to work since 2000 are strikingly few. (For instance, evidence for publications on medical marketing in the 1890s is footnoted to the twenty-first edition of *Smith's Advertising Agency*, published in 1885 [n. 31 on p. 71].) In his necessarily selective approach, Takahiro Ueyama completely excludes consideration of noncommercial herbal treatments based on common plants, which were certainly widespread. Such details should not, however, distract us from the profound issues raised by this ambitious volume.

The first word of the text is "Multinationals." By page 9 we learn that "in one capacity . . . this

is a history book." What else can it be? The paragraph ends without telling us explicitly in what other capacities the volume is acting, but it gives us a clue: "not just in America and not just in the last few decades—medicine and money have been intimate partners indeed." So this volume can be seen as an attempt to give a historical lineage to contemporary concerns. Of course histories cannot escape their times; as David Cannadine famously reminded us in reviewing accounts of the industrial revolution, "all history is contemporary history" (David Cannadine, "The Present and the Past in the English Industrial Revolution, 1880–1980," *Past and Present*, 1984, 103:131–172). On the other hand, many do try to act as if "the past is a foreign country. They do things differently there." This account is an attempt to do the inverse, to show parallels between the British past and the American present. To use the language of Kenneth Burke, this is an attempt to delineate a "representative anecdote" for the typical accounts of modern American medicine.

The consequence of this approach is a form of picture very different from that typically delineated by historians of late nineteenth-century Britain. We learn about "Londoners" in the way that U.S. writers will generalize about "Americans," without real reference to class as a key factor in patterns of consumption. Missing is the texture of Charles Booth's London. And of course Booth himself is not mentioned. The result is a fascinating and perhaps enriching image of the late nineteenth century. We have, however, to ask to what extent it is accurate. It may be said that in general this book is much more concerned with the construction of the consumer by the entrepreneurs than with medical consumers as living, breathing human beings with urgent medical concerns. The author is concerned, for instance, with gender issues and the question of who might have been the targets of the advertising he explores, but his historiographic inspiration is found in U.S. marketing history, not British social history.

By treating customers who purchased medicaments as consumers, the book raises the more serious issue—implicitly but not explicitly—of the adequacy of the word "consumer" to describe the mother of a dying child or the seriously depressed victim of neurasthenia. The author does say, "Not because they were actually sick did members of the public buy patent medicines, but because drugs and health drinks were sold as therapeutic commodities" (p. 76; see also the almost identical passage on p. 21). I could not find the provision of any evidence for this statement. Neither, apparently, is the difficulty